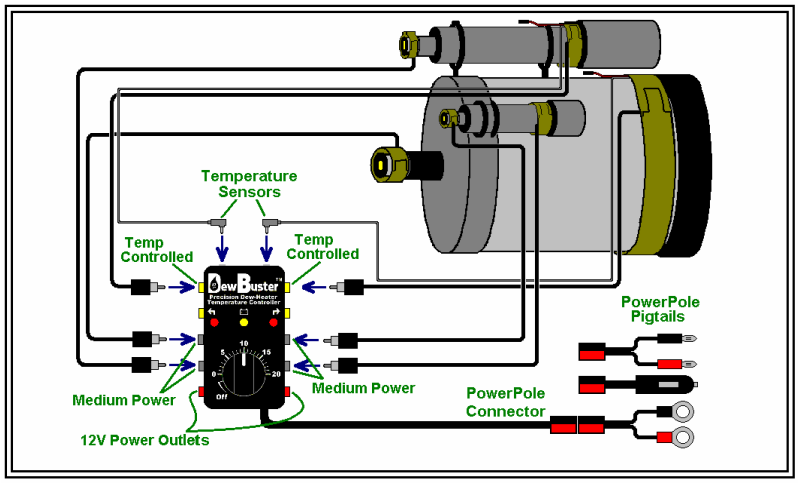
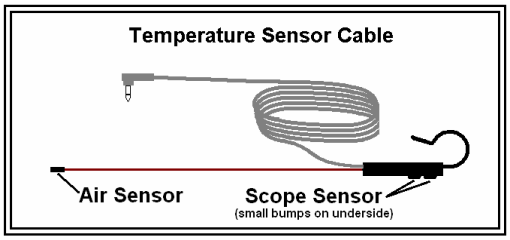
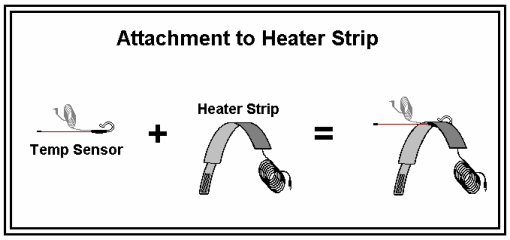
DewBuster™ Controller – SCT / Refractor Instructions

NOTE: These instructions are for SCT and Refractor Telescopes. If you are using a Newtonian telescope the NEWTONIAN INSTRUCTION MANUAL may be downloaded from www.dewbuster.com

QUICK START







Color coded RCA Jacks on sides of controller are the Heater Outputs:

- **YELLOW** - Temperature Controlled Heater Output (when sensor plugged in)
- **BLACK** - Medium Power Heater Output
- **RED** - 12V Power for accessories (inner terminal positive) or Full Power Heater Outputs

If a Temperature Sensor is used on a heater, attach sensor to heater strip as shown above and place heater just behind dew shield so that it can warm the air inside telescope tube which then warms the glass from the inside. Plug heater strip into Temperature Controlled Heater Output (yellow) and plug Temperature Sensor into top input jack on same side. Note that temperature control of Corrector Plate or Objective Lens heater can improve optical performance. It can also save battery energy when used with large heaters.

Heater strips without temperature sensors should be plugged into Medium Power Heater Outputs and operate at 40% power which should prevent dew if applied at the beginning of the night. If additional power is needed, increasing control knob beyond 15 will gradually raise the power level. Note that temperature control will not save much power on small heaters and will only increase optical performance when used on Corrector Plate or Objective Lens.

12V accessories may be powered from the red 12V Outlets. Note that these outlets are not regulated; they will be the same voltage as the controller's power source. The 12V Outlets also serve as Full Power Heater Outputs and may be used to get extra power from an undersized heater.

WARRANTY & TECH SUPPORT

Your DewBuster™ Controller is warranted to the original purchaser for 5 years from the date of purchase. If it fails for any reason, contact me for return instructions. I will expedite the repair to minimize the time you are without your controller. Failures beyond the warranty period and controllers purchased second hand will be repaired at a flat-rate fee. Contact me for a quote.

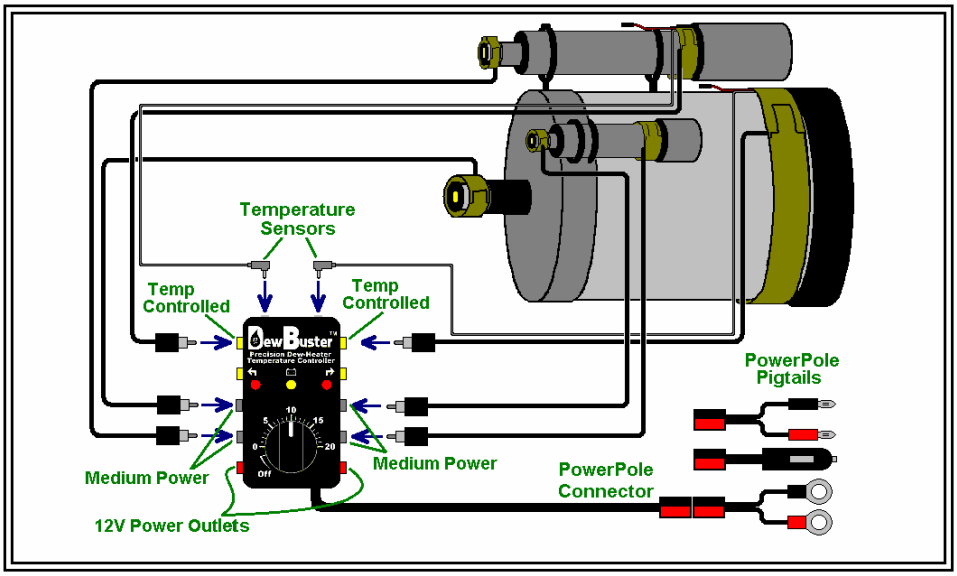
Ron Keating
269 St. Andrews Blvd., Laplace, LA 70068 USA

E-mail address changes periodically due to SPAM so go to:
www.dewbuster.com
and click on CONTACT ME for current e-mail address.

1 Prior model DewBuster™ Controllers used white RCA Jacks for TC Outputs however the function is the same.

OVERVIEW

Heat prevents dew, but too much blurs the highly magnified image in your telescope. Your DewBuster™ Controller measures temperature and precisely controls power to the heater in order to warm the lens just above the air temperature resulting in optimal telescope performance and saving battery power. The Temperature Sensor Cable clips onto your heater strip measuring both air and telescope temperature and plugs into either the Left or Right Temperature Sensor Input controlling the Temperature Controlled Outputs (yellow) on that side. The DewBuster's control knob determines how many °F the telescope is warmed above the air temperature (5 means telescope 5°F warmer than the air). When no temperature sensor is plugged in, the Temperature Controlled Outputs on that side are not wasted because they function as Medium Power Outputs and function exactly as described below.



Medium Power Outputs (black) are intended for small heaters such as finderscope, eyepiece, Telrad, etc. that do not affect telescope performance so they are simply run at a higher power level than the Temperature Controlled Outputs to prevent dew without using a sensor. Medium Power normally runs at 40% power level but can be controlled manually as follows:

CONTROL KNOB SETTING	0° to 12°	15°	17°	19°	20°	Fully Clockwise
MP OUTPUT POWER	40%	50%	60%	70%	75%	100%

The DewBuster™ Controller has 3 LED's:

LEFT and **RIGHT** – these red LED's blink as the LEFT and RIGHT Temperature Controlled Outputs (yellow) are pulsed with 12V power to control the temperature. The longer the blink time the more heat will be generated (Pulse Width Modulation). The red LED's may also be used to check the Medium Power blink rate by unplugging the Temperature Sensor. The LED's are optimized for night vision and thus may be difficult to see during daytime.

CENTER – the yellow LED is a Battery Voltage Warning. Under normal conditions it will be "off" (battery Voltage above 10.5VDC (protects battery) and below 15VDC (protects your heaters). If you are running on battery and the yellow LED starts flickering you should consider unplugging any items that you can do without. As the battery weakens, the yellow LED brightens and the controller limits heater power (red LED's grow dimmer) to allow as much heat as possible while preventing battery from being drained below 10.5V (prevents battery damage). When battery is exhausted red LED's will remain off (no heat) and the yellow LED will remain on (battery at 10.5V) but your battery is protected from damage. If yellow LED illuminates with a fully charged battery or when using a power supply, check for poor connections and that your power source can provide sufficient current. If you need assistance contact Tech Support (page 4).

The DewBuster™ Controller is fully compatible with most 12-Volt heating strips that use RCA plugs such as Astrozap, Dew-Not, Kendrick, Thousand Oaks, and home-built heaters using my instructions at www.dewbuster.com (your warranty even covers any damage caused by mistakes building your heaters). The unit is fully protected from reverse polarity, over-current, and shorted heaters (if a yellow output jack's red LED goes out when a heater is plugged in, that heater has a short, see Technical Support article at www.dewbuster.com for the fix). The controller is rugged and may be operated continuously 24/7.

Installation on Your Telescope

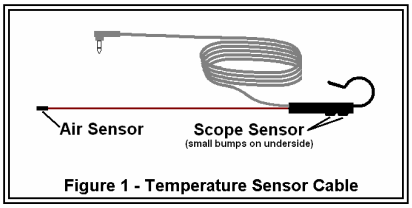


Figure 1 - Temperature Sensor Cable

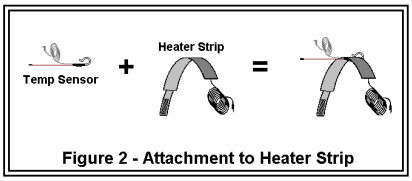


Figure 2 - Attachment to Heater Strip

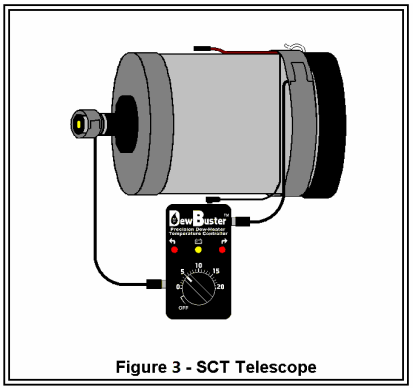


Figure 3 - SCT Telescope

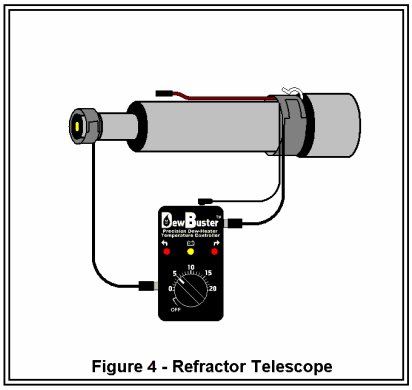


Figure 4 - Refractor Telescope

TEMPERATURE CONTROLLED HEATERS:

NOTE: If Sensor Cable is unplugged the associated outputs (yellow) operate as Medium Power Outputs.

- Attach Sensor Cable (Fig.1) to heater strip as shown in Fig.2.
- Attach heater strip to telescope (Fig. 3 or 4) making sure Scope Sensor (Fig.1) is against telescope tube and Air Sensor does not touch telescope. **NOTE: The best location for the heater strip is just behind the corrector plate casting (Fig.3) or refractor dew shield (Fig.4) so that it warms the air inside the telescope as close to the lens as possible. Do not place heater around dew shield because the heat will just escape into the atmosphere.**
- On an SCT Telescope install the dew shield taking care that the Sensor Cable remains in position. It is imperative to use a dew shield (they are easy to make, see instructions at www.dewbuster.com).
- Plug Temperature Sensor Cable into Left or Right Sensor input (Fig. 4 or 5) and plug heater strip into the Temperature Controlled Output on that side (color coded yellow, see diagram on page 1).

MEDIUM POWER HEATERS:

- Install heater strips and plug into any Medium Power output (black) or into a Left Output or Right Output that is operating in Medium Power Mode (Temperature Sensor Cable unplugged).

12V OUTPUTS:

The 12V outputs (color coded red) may be used to power accessories (10 Amps maximum per RCA jack) or to drive a heater at full power (constant 100% output). **Center terminal is +**. Note that they do not turn off when the control knob is turned to the OFF position and they are not regulated, the voltage will be the same as the DewBuster™ Controller's power source.

TURNING ON CONTROLLER:

- Connect controller to 12 Volt battery or 13.8VDC power supply.

CAUTION: Never power a dew controller from your telescope's DC Power Output Jack because the high current may burn up wires inside your telescope!

- Turn control knob to desired setting (first time users see DETERMINING TEMPERATURE SETTING below).
- The Temperature Controlled Output may go to full power (LED on) as telescope warms up, but should blink when it reaches correct temperature. The LED may stop blinking for a short time if the telescope needs to cool down.
- The middle Battery Warning LED should not illuminate.

DETERMINING TEMPERATURE SETTING:

- The lowest setting that prevents dew will deliver the best telescope images. As a starting point set the control knob to 5 degrees (10 degrees for 12" or larger scopes). Operate at this setting for the first night and if no dew forms then try a slightly lower setting each subsequent night until dew forms.
- If dew forms, temporarily unplug the Sensor Cable and turn the control knob to maximum. When the dew clears plug the Sensor Cable back in and set the control knob higher than the setting where dew formed.
- Once you learn the ideal setting for your telescope, just set it there each night and forget about it. The ideal setting should prevent dew from forming under all conditions. Do not readjust the setting throughout the night as this prevents your telescope from reaching thermal equilibrium and performing at its best.

DEW BURN-OFF - It takes much more heat to clear dew than to prevent it from forming in the first place. If dew has formed, place the controller in Dew Burn-Off mode by unplugging the Sensor Cable(s) and turning the control knob fully clockwise. All outputs will go to full power (red LED's remain on). After the dew clears, plug the Sensor Cable(s) back in and use a control knob setting slightly higher than the setting that allowed dew to form.

Moisture Inside Telescope – if condensation forms **inside** a closed tube telescope it is trapped moisture and not dew. This usually occurs during winter months when a telescope that was stored indoors is brought out into the cold outside air. Indoor air is warm so it absorbs moisture. If that air enters the telescope it will cause condensation inside the tube when it is brought outside and cools. This moisture can not be removed with a dew heater, the telescope tube must be ventilated so the humid air is replaced by drier outside air. **During winter:** Uncap telescope as soon as it is brought outside so that the humid air inside can escape. If the problem is particularly bad, buy or build an SCT cooler (a device which blows outside air into telescope pushing out the air trapped inside). To prevent it from happening, at the end of your observing session dry any moisture from the exterior of the telescope and cap the telescope or place the tube in an air-tight plastic bag. When the telescope is brought indoors do not remove the caps / bag until it has warmed up to the indoor air temperature because as the air trapped inside warms up it becomes much drier than the air in your home. It is best to leave the telescope capped / bagged to prevent humid indoor air from entering the telescope tube. **During summer:** The telescope should be stored in an air conditioned environment because it is less humid. To prevent the lenses from fogging up when the cool telescope is brought outside, put the telescope in a bag or keep the lenses capped until the telescope has warmed to the outside air temperature. Since the air conditioned environment is drier, when the telescope is brought back indoors you may uncap the telescope to allow any moisture to dry up.

Troubleshooting Problems

Symptom	Most Likely Cause
Center of corrector plate or lens dews up.	• Be sure to use a dew shield (heater strip alone can't keep up with corrector plate heat loss). • Is heater strip installed just behind corrector plate casting or lens dew shield? This is the most effective because it warms the air inside tube just behind lens. • Temperature set too low. See "DETERMINING TEMPERATURE SETTING" on page 2.
Center yellow LED flickers	• Battery low on charge, poor connections, or power source unable to supply enough current for dew heaters.
No LED's lit.	• LED's are optimized for night time conditions and thus may be difficult to see during daylight. • Unplug Temperature Sensor(s) and if red LED's do not blink start unplugging heaters to see if a faulty heater is causing problem. When all heaters are unplugged, if red LED's do not blink then power is not getting to controller. If you have a cigarette plug power cord check if LED is lit? Check that plug is fully inserted into socket, battery polarity is correct, and fuse is not blown (AGC10 fuse is accessed by unscrewing tip of cigarette plug). • Heavy Duty power cord has PST fuse, disconnect power and fuse will reset when it cools off. • Check that your power source is working and the wires are not reversed.
One red LED will not illuminate.	• Unplug heaters one at a time , if LED comes on then last heater unplugged may have short in it. Check heater per instructions at www.dewbuster.com under Technical Support (left sidebar) article "Repair Shorted Heater". Shorts are often intermittent so even if problem disappears you should still check your heater(s) as described in the article.
Temp Controlled LED stays on constantly.	• Normal when first turned on, but LED should start blinking after scope warms up. • Temperature Sensor not making contact with telescope (page 2 Fig.1) or unplugged. • Air Sensor (page 2 Fig.1) too close to warm object like a heater strip or your body. • Check that proper side of heater is against metal part of telescope and getting warm.
Battery runs down very quickly	• Shorted heater (see Technical Support article "Repair Shorted Heater" at www.dewbuster.com). • Insufficient battery capacity, use at least 17AH battery for an 8" SCT. • If dead battery recharges very quickly it is not storing energy and should be replaced.